INVESTIGATION TECHNIQUES FOR THE DETERMINATION OF SEDIMENT TRANSPORT IN THE SOUTHERN BIGHT OF THE NORTH SEA

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About 30.000.000 tons of dry solids are dredged annually in the maritime harbours and access channels along the Belgian North Sea coast. Authorities and consultants put considerable effort into the research of the behaviour of dumped material since 1984. This research has given special focus to the study of the dispersion and recycling of fine grained material.

The conducted research used different techniques to evaluate the natural processes involved. The dumping processes were measured using radioactive tracers. These allowed to trace the dispersion of the dumped sand and mud fraction. Vibrocoring on the dumping sites revealed the absence of a significant mud fraction. In order to define the total sediment balance, differential mapping and volumetric calculations verify these observations. They stressed the separation of the sand fraction, which remains mainly on the dumping site, and the mud fraction, which is able to recycle. The migrations and recycling of these dump losses were measured using long-life radioactive recycling tracers.

Finally, the residual sediment transport paths were determined using statistical calculation methods on grain-size data. Krigeing techniques enabled a 2-dimensional approach and allowed the analysis of irregularly spaced samples. The coherent results of the analysis of two large databases illustrate the strength of this technique. The spatial variations of the different fractions complement the interpretation of the results of the sediment trend analysis.

The results of these different analysis techniques revealed a zone of essentially coastward transport. This zone extends seawards to about 5 km to the west and 20 km to the east of the Belgian Continental Shelf. Within this zone, a high probability of recycling dominates. Displaced fine sediments will always tend to move to an area where they are in dynamic equilibrium.